converter 6 converts the audio output from the decoder 3 into the analog audio signal and outputs the analog audio signal to the speaker SP1.

As apparent from the above description, according to the present invention, in the case where the standard TV system will coexist with the HDTV system commercially available in the near future, the digital VCR can record both the HDTV broadcasting signal and the NTSC broadcasting signal, convert the HDTV broadcasting signal into the NTSC broadcasting signal for the playback and convert the NTSC broadcasting signal into the HDTV broadcasting signal for the playback.

Although the preferred embodiments of the present invention have been disclosed for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims.

What is claimed is:

1. A television-integrated video cassette recorder apparatus comprising:

a high definition television for receiving a high definition television signal from a broadcasting station;

a digital video cassette recorder for recording and playing back the high definition television signal or a standard television signal on/from a magnetic tape, said high definition television displaying the high definition television signal; and

interface means for converting a format of the high definition television signal into a recording format of said digital video cassette recorder in a recording mode, converting a format of a playback signal from said digital video cassette recorder into a high definition television format for said high definition television or a standard television format in a playback mode and performing a plurality of screen processing functions in a standard television manner.

2. A television-integrated video cassette recorder apparatus as set forth in claim 1, wherein said digital video cassette recorder includes:

encoding means for selecting one of the high definition television signal and the standard television signal and encoding the selected television signal.

3. A television-integrated video cassette recorder apparatus as set forth in claim 1, wherein said digital video cassette recorder includes:

encoding means for selecting one of the high definition television signal and the standard television signal and encoding the selected television signal; and

formatting means for formatting an encoded signal from said encoding means into a recording format having a toughness against a burst error component.

4. A television-integrated video cassette recorder apparatus as set forth in claim 1, further comprising:

digital audio input/output means for inputting and outputting digital audio signals from/to said high definition television and said digital video cassette recorder; and

analog audio output means for inputting an analog audio signal from said digital video signal cassette recorder and outputting the inputted analog audio signal to a speaker.

5. A television-integrated video cassette recorder apparatus as set forth in claim 1, wherein said interface means includes:

a scanning format converter for converting a scanning format of the video data from said high definition

television into the recording format of said digital video cassette recorder in the recording mode under control of a synchronous frequency-divider, a clock frequency-divider and a format controller;

a format region converter for converting a size of video output data from said scanning format converter into a desired size; and

a video divider for dividing video output data from said format region converter by regions according to a video importance,

said scanning format converter, said format region converter and said video divider performing said operation in the reverse order in the playback mode.

**6**. A television-integrated video cassette recorder apparatus as set forth in claim **5**, wherein said format controller controls said scanning format converter in response to an output signal from a clock detector and scanning conversion control data from a scanning format determinator to perform progressive/interlaced scanning conversion or interlaced/progressive scanning conversion with respect to the video data using inter-field interpolation or intra-field interpolation, said clock detector determining the data format in response to a clock signal and a format select mode signal, said scanning conversion control data from said scanning format determinator being determined based on a motion vector and a displaced frame or field difference signal.

**7**. A television-integrated video cassette recorder apparatus as set forth in claim **1**, wherein said digital video cassette recorder includes: formatting means for formatting an encoded signal into the recording format of said digital video cassette recorder to have a toughness against a burst error component.

**8**. A television-integrated video cassette recorder apparatus as set forth in claim **7**, wherein said formatting means includes:

a segment separator for separating a synchronous signal and data information from each segment of the encoded signal;

a data memory for storing the data information from said segment separator;

a header appender for appending an identifier and status information to the synchronous signal from said segment separator in the unit of segment in response to an interleaving control signal;

a demultiplexer for demultiplexing an output from said data memory in the unit of segment in response to the interleaving control signal;

a plurality of buffers for buffering the demultiplexed outputs from said demultiplexer, respectively;

a plurality of delay elements for delaying outputs from said buffers for different predetermined time periods, respectively;

a multiplexer for multiplexing outputs from said delay elements in response to the interleaving control signal;

an interleaver for interleaving an output from said multiplexer into a new format in response to the interleaving control signal; and

a segment reformatter for formatting an output from said header appender and an output from said interleaver into the recording format having the toughness against the burst error component.

**9**. A television-integrated video cassette recorder apparatus as set forth in claim **1**, wherein said digital video cassette recorder includes:

a scrambler for scrambling a video signal of the high definition television signal or a video signal of the standard television signal to make a data size uniform;

a discrete cosine transform unit for performing a discrete cosine transform operation with respect to an output from said scrambler;

an activity calculator for calculating an activity of an output from said discrete cosine transform unit;

a control parameter calculator for calculating a control parameter in response to an output from said activity calculator; and

a control parameter initializer being initialized in response to the calculated control parameter from said control parameter calculator.

**10**. A television-integrated video cassette recorder apparatus as set forth in claim **9**, further comprising:

a delay element for delaying the output from said discrete cosine transform unit for a predetermined time period;

a data selector for selecting an output from said delay element under control of said control parameter initializer if a control output of said control parameter initializer is greater than a predetermined level;

a human visual system unit for multiplying an output from said data selector by a weight function under the control of said control parameter initializer;

a quantizer for quantizing an output from said human visual system unit under the control of said control parameter initializer;

a variable length coder for performing variable length coding with respect to an output from said quantizer in response to information from a field based variable length code table, information from a frame based variable length code table and the scanning conversion information;

a buffer for buffering a coded bit stream from said variable length coder; and

a coding controller for checking an output rate of said buffer and controlling said data selector and said quantizer in accordance with the checked result.

**11**. A television-integrated video cassette recorder apparatus as set forth in claim **1**, wherein said interface means includes:

formal conversion means for discriminating a format of video data from said high definition television or said digital video cassette recorder, performing scanning formal conversion and size conversion with respect to the video data in accordance with the discriminated result and dividing the video data by regions or synthesizing the divided video data.

**12**. A television-integrated video cassette recorder apparatus as set forth in claim **11**, further comprising:

post-processing means for processing video outputs from said format conversion means to perform the plurality of screen processing functions in the standard television manner and outputting the processed video data to digital/analog conversion means; and

sampling means for sub-sampling the video outputs from said format conversion means and up-sampling the video data from said digital video cassette recorder.

**13**. A television-integrated video cassette recorder apparatus as set forth in claim **12**, wherein said post-processing means includes:

a format converter for converting a format of the video outputs from said format conversion means into the standard television format under control of a mode selector;

a picture zoomer for adjusting a size of a video to be displayed on a screen of a standard television monitor;

an art processor for performing a video edit function; and

a color inverter for performing a color inverting function.

**14**. A television-integrated video cassette recorder apparatus as set forth in claim **11**, wherein said interface means includes:

a sub-sampler for sub-sampling the video outputs from said format conversion means; and

an up-sampler for up-sampling the video data from said digital video cassette recorder.

**15**. A television-integrated video cassette recorder apparatus as set forth in claim **14**, wherein said sub-sampler includes:

a plurality of low pass filters for removing high frequency components from the video outputs from said format conversion means to limit frequency bands thereof, respectively;

a plurality of sub-sampler elements for sub-sampling outputs from said low pass filters, respectively; and

a plurality of video synthesizers for synthesizing Y components, U components and V components of outputs from said sub-sampler elements, respectively.

**16**. A television-integrated video cassette recorder apparatus as set forth in claim **14**, wherein said up-sampler includes:

a plurality of video dividers for dividing the video data from said digital video cassette recorder, respectively;

a plurality of up-sampler elements for up-sampling outputs from said video dividers, respectively; and

a plurality of low pass filters for removing high frequency components from outputs from said up-sampler elements to limit frequency bands thereof, respectively.

**17**. A television-integrated video cassette recorder apparatus comprising:

a high definition television for receiving a high definition television signal from a broadcasting station;

a digital video cassette recorder for recording and playing back the high definition television signal or a standard television signal on/from a magnetic tape, said digital video cassette recorder including:

formatting means for dividing a video signal of the high definition television signal or a video signal of the standard television signal into odd and even field data and converting a data format according to scanning conversion information, and

coding means for scrambling output data from said formatting means and coding the scrambled data suitably to a video characteristic; and

interface means for converting a format of the high definition television signal into a recording format of said digital video cassette recorder in a recording mode, and converting a format of a playback signal from said digital video cassette recorder into a high definition television format or a standard television format in a playback mode.

**18**. A television-integrated video cassette recorder apparatus as set forth in claim **17**, wherein said interface means includes:

format conversion means for discriminating a format of video data from said high definition television or said digital video cassette recorder, performing scanning format conversion and size conversion with respect to the video data in accordance with the discriminated result and dividing the video data by regions or synthesizing the divided video data;

post-processing means for processing video outputs from said format conversion means to perform a plurality of

screen processing functions in a standard television manner; and

sampling means for sub-sampling the video outputs from said format conversion means and up-sampling the video data from said digital video cassette recorder.

**19**. A television-integrated video cassette recorder apparatus as set forth in claim **17**, wherein said coding means includes:

a scrambler for scrambling the video signal of the high definition television signal or the video signal of the standard television signal to make a data size uniform;

a discrete cosine transform unit for performing a discrete cosine transform operation with respect to an output from said scrambler;

an activity calculator for calculating an activity of an output from said discrete cosine transform unit;

a control parameter calculator for calculating a control parameter in response to an output from said activity calculator; and

a control parameter initializer being initialized in response to the calculated control parameter from said control parameter calculator.

**20**. A television-integrated video cassette recorder apparatus as set forth in claim **19**, further comprising:

a delay element for delaying the output from said discrete cosine transform unit for a predetermined time period;

a data selector for selecting an output from said delay element under control of said control parameter initializer if a control output of said initializer is greater than a predetermined level;

a human visual system unit for multiplying an output from said data selector by a weight function under the control of said control parameter initializer;

a quantizer for quantizing an output from said human visual system unit under the control of said control parameter initializer;

a variable length coder for performing variable length coding with respect to an output from said quantizer in response to information from a field based variable length code table, information from a frame based variable length code table and the scanning conversion information;

a buffer for buffering a coded bit stream from said variable length coder; and

a coding controller for checking an output rate of said buffer and controlling said data selector and said quantizer in accordance with the checked result.

21. A television-integrated video cassette recorder apparatus comprising:

a high definition television for receiving a high definition television signal from a broadcasting station;

a digital video cassette recorder for recording and playing back the high definition television signal or a standard television signal on/from a magnetic tape; and

interface means for converting a format of the high definition television signal into a recording format of said digital video cassette recorder in a recording mode, converting a format of a playback signal from said digital video cassette recorder into a high definition television format or a standard television format in a playback mode and performing a plurality of screen processing functions in a standard television manner, wherein said interface means includes,

format conversion means for discriminating a format of video data from said high definition television or said digital video cassette recorder, performing scanning format conversion and size conversion with respect to the video data in accordance with the discriminated result and dividing the video data by regions or synthesizing the divided video data,

post-processing means for processing video outputs from said format conversion means to perform the plurality of screen processing functions in the standard television manner and outputting the processed video data to a digital/analog conversion circuit,

sampling means for sub-sampling the video outputs from said format conversion means and up-sampling the video data from said digital video cassette recorder,

digital audio input/output means for inputting and outputting digital audio signals from/to said high definition television and said digital video cassette recorder, and

analog audio output means for inputting an analog audio signal from said digital video cassette recorder and outputting the inputted analog audio signal to a speaker.

* * * * *

22. A format conversion unit for converting video signals comprising:

switching unit receiving a baseband video signal;

a control unit controlling the switching unit;

a scanning format converter receiving the baseband video signal from the switching unit when the baseband video signal includes a non-interlaced video signal and outputting an interlaced video signal, the switching unit by-passing the scanning format converter when baseband video signal includes an interlaced video signal; and

a format region converter coupled to the switching unit and the scanning format converter and outputting a standard definition video signal, format region converter converting a display size of the video signal when the baseband video signal includes the interlaced video signal.

23. The format conversion unit according to claim 22, wherein the format region converter by-passing the video signal when the baseband video signal includes the non-interlaced video signal.

24. The format conversion unit according to claim 22, wherein the format region converter converting a display size of the video signal when the baseband video signal includes the non-interlaced video signal.

25. A method for processing a video signal, the method comprising the steps of:

receiving a baseband video signal;

determining whether the baseband video signal is an interlaced or non-interlaced video signal;

converting the baseband video signal to an interlaced video signal when the non-interlaced video signal is received; and

converting a size of the baseband video signal to conform to a standard definition video signal when the interlaced video signal is received.

26. A video signal recording system having a format conversion unit for converting video signals comprising:

a scanning format converter receiving baseband video signal and outputting an interlaced video signal;

a format region converter coupled to the scanning format converter and outputting a standard definition video signal, the format region converter converting a display size of the video signal when the baseband video signal includes an interlaced video signal or by-passing the video signal when the baseband video signal includes a progressive video signal;

a video divider coupled to the format region converter and dividing the standard definition video signal, the video divider outputting a divided video signal;

a subsampler receiving the divided video signal and subsampling the divided video signal, the subsampler outputting a subsampled video signal; and

a video recorder receiving the subsampled video signal from the subsampler.

27. A video recording system according to claim 26, wherein the video recorder comprises:

an encoder receiving one of the subsampled video signal and an externally received standard definition video signal, the encoder outputting an encoded video signal;

an error correction unit coupled to the encoder and correcting errors in the encoded video

signal, the error correction unit outputting an error corrected video signal;

a formatter coupled to the error correcting unit and formatting the error corrected video signal, the formatter outputting a formatted video signal;

a channel modulator coupled to the formatter and modulating the formatted video signal, the channel modulator outputting a channel modulated video signal;

an amplifier receiving and amplifying the channel modulated video signal, the amplifier outputting an amplified video signal; and

a recording head receiving the amplified video signal.

28. A video recording/reproducing system comprising:

a scanning format converter receiving baseband video signal and outputting an interlaced video signal;

a format region converter coupled to the scanning format converter and outputting a standard definition video signal, the format region converter converting a display size of the video signal when the baseband video signal includes an interlaced video signal or by-passing the video signal when the baseband video signal includes a progressive video signal;

a video divider coupled to the format region converter and dividing the standard definition video signal, the video divider outputting a divided video signal;

a subsampler receiving the divided video signal and subsampling the divided video signal, the subsampler outputting a subsampled video signal;

a video recorder receiving the subsampled video signal from the subsampler;

an encoder receiving one of the subsampled video signal and an externally received standard definition video signal;

an error correction unit coupled to the encoder;

a formatter coupled to the error correcting unit;

a channel modulator coupled to the formatter;

a first amplifier receiving and amplifying the channel modulated video signal;

recording head receiving the amplified video signal;

a second amplifier coupled to the recording head;

an equalizer coupled to the second amplifier;

a channel demodulator coupled to the equalizer;

a deformatter coupled to the channel demodulator;

an error correction unit coupled to the deformatter; and

a decoder coupled to the error correction unit.

29. A video processing unit comprising:

an upsampling unit receiving a standard definition video signal, the standard definition video signal having subvideo signals;

a format conversion unit coupled to the upsampling unit, the format conversion unit comprising:

a video divider receiving the upsampled video signal and combining the subvideo signals, the video divider outputting a combined video signal;

a format region converter coupled to the video divider and converting a display size of the combined video signal, the format region converter outputting a formatted video signal; and

a scanning format converter receiving the formatted video signal and outputting a

baseband video signal.

30. The video processing unit according to claim 29, further comprising an HDTV display unit, the HDTV display unit including:

a video processor receiving the baseband video signal;

a digital to analog converter coupled to the video processor and producing an analog video signal; and

a video monitor displaying the analog video signal.

31. A video cassette recorder system comprising:

a digital video cassette recorder recording one of a high definition television signal and a standard television signal on a magnetic tape, the digital video cassette recorder playing back one of the high definition television signal and the standard television signal from the magnetic tape on a high definition television;

an interface unit coupled to the digital video cassette recorder, the interface unit converting a format of the high definition television signal into a recording format of the digital video cassette recorder in a recording mode, the interface unit converting a format of a playback signal from the digital video cassette recorder into one of a high definition television format for the high definition television and a standard definition television format in a playback mode and performing a plurality of screen processing functions in a standard television manner.

32. The video cassette recorder system according to claim 31, wherein the digital video cassette recorder comprises:

a formatting unit dividing a video signal of one of the high definition television signal and the standard definition television signal into odd and even field data and converting a data format according to scanning conversion information; and

a coding unit coupled to the formatting unit, the coding unit scrambling output data from the formatting unit and coding the scrambled data suitably to a video characteristic.

33. The video cassette recorder system according to claim 31, wherein the interface unit comprises:

a format conversion unit discriminating a format of video data from one of the high definition television and the digital video cassette recorder, performing scanning format conversion and size conversion with respect to the video data in accordance with the discriminated result and dividing the video data by regions or synthesizing the divided video data;

post-processing unit coupled to the format conversion unit and processing video outputs from the format conversion unit to perform the plurality of screen processing functions in the standard television manner and outputting the processed video data to a digital/analog conversion circuit; and

sampling unit coupled to the format conversion unit and sub-sampling the video outputs from the format conversion unit and up-sampling the video data from the digital video cassette recorder.

34. The video cassette recorder system according to claim 31, wherein the interface unit further comprises:

a digital audio input/output unit inputting and outputting digital audio signals from/to a high definition television and the digital video cassette recorder; and

analog audio output unit inputting an analog audio signal from the digital video cassette recorder and outputting the inputted analog audio signal to a speaker.